Docket No. 3140-0075
Client No. MERL-1255
File No. 1159.42683X00

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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In re Application of :
:
Baback Moghaddam :
: Group Art Unit: 2623
Application No: 09/444,689 :
: Examiner: Colin M. Larose
Filed: November 22, 1999 :
:
For: GENDER CLASSIFICATION WITH SUPPORT VECTOR MACHINES

Appeal Brief Submittal

Honorable Assistant Commissioner
for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

July 28, 2003

Sir:

An Appeal Brief is submitted herewith in triplicate, in support of the Notice of Appeal filed May 28, 2003. PTO Credit Card Payment Form 2038 authorizing the amount of $320.00, for the Appeal Brief fee is enclosed.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment, to Deposit Account No. 01-2135, including any patent application processing fees under 37 CFR 1.17.

Respectfully Submitted,

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APPEAL BRIEF

Honorable Assistant Commissioner
for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted (in triplicate) in support of the Notice of Appeal filed May 28, 2003 of finally rejected claims as set forth in the final Official Action dated December 30, 2002.

I. REAL PARTY IN INTEREST

Mitsubishi Electric Research Laboratory, Reel 011564, Frame 0329.

II. RELATED APPEALS AND INTERFERENCES

NONE.

III. STATUS OF CLAIMS

Claims 1-8 and 10-12 are pending in this application, of which claim 1 is independent. Each of claims 1-8 and 10-12 is subject to appeal.

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IV. STATUS OF AMENDMENTS

No amendments to the pending claims have been filed or entered. An amendment adding claims 6-12 was filed on November 11, 2002, and an amendment canceling claim 9 was filed on April 30, 2003. Both amendments have been entered, the amendment filed on April 30, 2003 having been entered upon the filing of the Notice of Appeal on May 28, 2003.

V. SUMMARY OF INVENTION

In summary, and as shown in preferred embodiment/implementation in Figures 1 and 2, and described on page 3, line 11, thru page 4, line 4, and page 4, line 15, thru page 11, line 16, and as further evidenced by the experimental results described on page 11, line 20, thru page 13, line 1, the method for classifying images of faces according to gender, as recited in claim 1, comprises the steps of supplying a vector support machine 150 with a plurality of training images 101. The training images 101 include images of male and female faces. A plurality of support vectors SV are determined from the training images for identifying a hyperplane 200. The support vector machine 150 is supplied with a test image 102, and the gender 210,220 of the test image is classified with respect to the hyperplane 200 (See Figure 2).

Preferably, as recited in claim 2, the method further comprises the steps of scaling 111 the training images 101 to locate the faces, and warping 121 the scaled images to locate facial features.

Typically, as recited in claim 3, the facial features include hair. If so, the method advantageously further comprises the step of masking 130 the scaled images to reduce the amount of hair.

As recited in claim 4, the method may also beneficially further comprise the step of reducing the resolution of the training images 101 and the test image 102 by sub-sampling 140 before supplying the images to the support vector machine 150.

According to claim 5, the method may also further comprise the step of maximizing a distance between the support vectors SV and error margins 201, 202 of

the hyperplane 200 (See Figure 2).

In accordance with claim 6, the image 141 beneficially contains less than 260 pixels (see page 11, line 22).

As recited in claim 7, preferably the hyperplane 200 is a non-linear hyperplane (see Figure 2).

According to claim 8, the classification error is less than 4% (see, for example, page 11, line 23, thru page 12, line 1).

As recited in claim 10, the method preferably also comprises determining the non-linear hyperplane 200 using a non-linear projection function (see, for example, page 6, lines 6-8).

Claim 11 beneficially requires that the projection function is a radial basis function that minimizes an upper bound on an expected test error (see, for example, page 9, lines 3-5).

In accordance with claim 12, the method further comprises determining the hyperplane 200 using a quadratic classifier (see, for example, page 11, lines 1-9).

VI. ISSUES

Whether claims 1-8 and 10-12 are obvious, under 35 U.S.C. § 103(a), over the Osuna et al. article entitled "Training Support Vector Machines: an Application to Face Detection", in view of the article by Gutta et al. entitled "Gender Classification of Human Faces Using Hybrid Classifier Systems". Whether claims 2 and 3 are obvious, under 35 U.S.C. § 103(a), over Osuna and Gutta, in further view of Moghaddam (U.S. Patent No. 5,710,833).

VII. BRIEF DESCRIPTION OF THE REFERENCES

Osuna et al.

Osuna describes a system for detecting objects having similar characteristics using a support vector machine (SVM). That is, Osuna, is directed to object detection (i.e. the detection of similar objects, such as human faces), rather than object

classification (i.e. the classification of similar objects, such as gender classification of human faces).

As described in the bridging paragraph on pages 133 and 134, Osuna discloses is that "there are many....object classes and phenomena in the real world that share similar characteristics, for example, tumor anomalies in MRI scans, structural defects in manufactured parts, etc."

As discussed, for example in section 3.2, on page 134, Osuna's system utilizes relatively low-resolution images (e.g. 361 pixel patterns).

Gutta

Gutta discloses a hybrid classifier system for gender classifying a face as either male or female (see Gutta, section 3, first paragraph) using a decision tree (see Gutta, section 3.2). That is, Gutta, is directed to object classification (i.e. the classification of similar objects, such as gender classification of human faces).

According to Gutta, as for example discussed in the first paragraph of section 5 on page 1356, gender classification is performed using relatively high resolution images (e.g. 4608 pixels).

Moghaddam

It should be noted that the applied Moghaddam reference has overlapping inventorship with that of the present application.

Moghaddam, like Osuna, is directed to object detection, (i.e. thedetection of similar objects, such as human faces) rather than object classification (i.e. the classification of similar objects, such as gender classification of faces). Moghaddam discloses, in column 11, lines 15-18, that a bounded image may be masked so as to include only the interior of the face and thereby reduce the amount of hair from the scaled image.

VIII. THE REJECTION

In the final Official Action issued on December 30, 2002, claims 1-8 and 10-12 stand rejected as obvious, under 35 U.S.C. § 103(a), over the Osuna et al. article entitled "Training Support Vector Machines: an Application to Face Detection", in view of the article by Gutta et al. entitled "Gender Classification of Human Faces Using Hybrid Classifier Systems". Claims 2 and 3 additionally stand rejected as obvious, under 35 U.S.C. § 103(a), over Osuna and Gutta, in further view of Moghaddam (U.S. Patent No. 5,710,833).

In the Advisory Action of May 13, 2003, the Examiner responds to the traversal arguments present in the response filed on April 30, 2003 by stating "as stated in the previous action (paper 7), there exists clear motivations to modify Osuna by Gutta to achieve the claimed invention. Also, the Moghaddam reference contains clear motivation for masking to reduce hair (claim 3). Lines 15-18 in column 11 teach the need to mask the image to focus on only the interior of the face, which contains the most salient facial components. The issue of 'detecting' verses 'classifying' was previously addressed. The Moghaddam reference relates to 'detecting' and 'recognizing' human faces, which is substantially in accordance with Osuna and Gutta's stated purposes. With respect to claim 6, the Examiner maintains that the image size is merely an arbitrary consideration and does not constitute a critical inventive aspect of the present invention."

IX. GROUPING OF CLAIMS

Claims 1-8 and 10-12 are pending in this application. Claims 1-8 and 10-12 are finally rejected and subject to this appeal.

Rejected claim 1 is independent. Accordingly the invention is defined within a single grouping of claims 1-8 and 10-12.

However, the claims of this group do not stand or fall together. Each of claims 1, 3, and 6 recite features and limitations which form an independent basis for allowance. Hence, claims 1, 2, 4-5, 7-8 and 10-12 stand and fall together; and each of claims 3 and 6 stands and falls alone.

X. ARGUMENT

Appellants respectfully traverse the rejections based on the prior art applied against the claims now pending on appeal. As discussed below in detail, it is respectfully submitted that the rejection relies upon art that has been combined without any motivation to do so. It is additionally respectfully submitted that the final rejection lacks the requisite supporting factual basis and/or reasonable rationale. Further still, it is respectfully submitted that the art applied in rejecting the claims neither teaches nor suggests the claimed invention. It is also respectfully submitted that recited limitations have been ignored and the relied upon art has been construed in a manner inconsistent with its own teaching, and the rejection is at best based on an improper hindsight reconstruction of the claimed invention or mere speculation.

1. THE EXAMINER HAS FAILED TO ESTABLISH A PRIMA FACIE CASE

The initial burden of establishing a basis for denying patentability to a claimed invention rests upon the examiner. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985); In re Piasecki, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984).

The limitations required by the claims cannot be ignored. See In re Wilson, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970). All claim limitation, including those which are functional, must be considered. See In re Oelrich, 666 F.2d 578, 212 USPQ 323 (CCPA 1981). Hence, all words in a claim must be considered in deciding the patentability of that claim against the prior art. Each word in a claim must be given its proper meaning, as construed by a person skilled in the art. Where required to determine the scope of a recited term, the disclosure may be used. See In re Barr, 444 F.2d 588, 170 USPQ 330 (CCPA 1971).

The Examiner must provide sufficient factual basis or rationale as to how features of the invention recited in the claims are taught or suggested in the applied art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). That is, objective evidence must be presented by the Examiner in support of the rejection. Without such support, the rejection is improper per se.

It is respectfully submitted that the Examiner has failed to establish a prima facie case for the rejection. More particularly, the Examiner has failed to provide objective support or reasonable rationale for the rejections, has ignored limitations recited in the claims, and has applied art in a manner inconsistent with its teachings.

In rejecting **claim 1**, the Examiner acknowledges that Osuna fails to disclose the required use of the described SVM for classifying the gender of a test image with respect to the hyperplane. The Examiner therefore proposes to modify Osuna, based on Gutta's disclosure of a system for classifying the gender of a test image, to make obvious the invention recited in claim 1.

In this regard, the Examiner asserts that it would have been obvious to so modify Osuna "since determining the gender of a person is one of the basic identifying features of a person, and Gutta teaches that a trainable learning system can be used to classify face images by gender. In addition, Osuna suggests that his classification system can be utilized to classify any 'object classes in the real world that share similar characteristics".

However, it is first respectfully submitted the Examiner's contentions ignore the fact that Osuna is directed solely to object detection not object classification.

More particularly, as set forth in the bridging paragraph on pages 133 and 134, what Osuna discloses is that "there are many other object classes and phenomena in the real world that share similar characteristics, for example, tumor anomalies in MRI scans, structural defects in manufactured parts, etc" (emphasis add). Thus, what Osuna is staytng in the relied upon text is that each of the identified object classes/phenomena which Osuna's system can detect will (and must) "share similar characteristics" (e.g. the different tumor anomalies which Osuna will detect must necessarily share similar characteristics, and the different structural defects in manufactured parts which Osuna will detect must necessarily share similar characteristics). However, since Osuna's system must detect these objects in relationship to other objects, each of the detected objects must also have substantially different characteristics than the objects from which they are to be distinguished (e.g. a tumor anomaly will have much different characteristics than a non-anomalous tumor,

and a defect in a part will have much different characteristics than a non-defective manufactured part). Otherwise, there would be no way for Osana to detect the objects of the object class/phenomena.

Accordingly, the final rejection fails to consider the teachings within the prior art as a whole. It is respectfully submitted that, the relied upon portion of Osuna, when read in context, fails to support the Examiner's assertions, and therefore has been misconstrued.

Furthermore, as discussed for example in section 3.2, on page 134, Osuna's system is directed to the beneficial utilization of low-resolution images (e.g. 361 pixel patterns). However, as for example discussed in the first paragraph of section 5, on page 1356, Gutta's gender classification, which as discussed above necessarily requires the detection of slight differences in objects having similar characteristics (e.g. male and female faces) is performed using high resolution images (e.g. 4608 pixels).

Thus, the proposed modification of Osuna, is inconsistent with its own teachings and would result in the Osuna being incapable of accomplishing one of its purposes (i.e. the utilization of low resolution images).

Further still, it should be recognized that while Gutta and the present invention are directed to accomplishing a similar objective (i.e. the classification of faces as either male or female), they go about accomplishing this objective in substantially different ways.

More particularly, Gutta teaches the use of a decision tree for classifying male/female faces, whereas the present application teaches the use of a SVM for classifying male/female faces. This is much more than a difference without distinction. As the present inventor, though his own efforts has discovered, by using a SVM to classify male/female faces, rather than, for example, a decision tree such as that taught by Gutta, substantially enhanced results can be obtained with substantially lower resolution images (See the Experimental Results on pages 11-13 of the present application and Section 5 of Gutta).

The Examiner points to paragraph 1, of section 5 of Gutta, on page 1356, as disclosing a reduction in the resolution of the training test images as required by claim

4. However, the Examiner then points to Osuna as disclosing that such reduction is too less than 260 pixels, as required by **claim 6**.

However, such a position is inconsistent with the teachings of Gutta, which (as noted above) requires a relatively high-resolution image in order to classify gender. It is respectfully submitted that there would be nothing in the applied prior art to suggest that, or how, the resolution of the training and test images used for classification of gender could be reduced below the 64x72 resolution disclosed by Gutta. Hence, the final rejection effectively ignores an explicit limitation of claim 6 or the express teachings of the prior art.

Claim 3 requires that the facial features include hair and that the scaled images are masked to reduce the amount of hair. Although rejected as obvious over the base combination of Osuna and Gutta, the Examiner has not identified any disclosure within either of these references in support of this rejection.

Claim 3 also stands rejected as obvious over the base combination, in further view of Moghaddam (which has overlapping inventorship with the present application). In this regard, the Examiner relies on Moghaddam's disclosure in column 11, lines 15-18, that the bounded image may be masked so as to include only the interior of the face and thereby reduce the amount of hair from the scaled image, in support of the rejection. The Examiner argues that masking the scaled images to reduce the amount of hair in object classification is obvious in view of Moghaddam, because scalp hair is not a facial feature and is therefore immaterial to determining gender.

However, Moghaddam, like Osuna, is directed to object detection, not object classification. As discussed by Osuna, and noted above, object detection requires that the objects of a class/phenomena to be detected share similar characteristics. Contrary to the Examiner's contention, scalp hair, which is typically cut and styled differently by men and women, is conventionally masked in object detection because this eliminates a difference between the male and female images, and thus aids in making the images of human faces (both the male and female faces) to be detected less likely to have dissimilar characteristics.

On the other hand, in the case of classification of faces, scalp hair has

conventionally been considered very material to determining the gender of a face, because it is a difference in objects of a class/phenomena which share similar characteristics.

Thus, Moghaddam does on teach or suggest that scalp hair should or could beneficially be removed in gender classification, and the final rejection fails to provide any explanation or rationale as to how Gutta could operate to accomplish its intended purpose if the scalp hair was masked.

Accordingly, it is respectfully submitted that the limitations of claim 3 have effectively been ignored and/or that applied prior art has been applied in a manner inconsistent with its own teachings, and in a way which would render the applied art incapable of accomplishing its purpose.

2. THERE IS NO MOTIVATION TO COMBINE THE ART AS PROPOSED BY THE EXAMINER

It is incumbent upon the Examiner to provide a basis in fact and/or cogent technical reasoning to support the conclusion that one having ordinary skill in the art would have been motivated to combine references to arrive at a claimed invention. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). In so doing, the Examiner is required to make the factual determinations set forth in Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 148 USPQ 459 (1966), and to provide a reason why one having ordinary skill in the art would have been led to modify the prior art reference to arrive at the claimed invention. Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985). Such a reason must stem from some teaching, suggestion or inference in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.d 281, 227 USPQ 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 USPQ 929 (Fed. Cir. 1984); In re Sernaker, 702 F.2d 989, 217 USPQ 1 (Fed. Cir. 1983).

It is respectfully submitted that there is nothing within any of the applied art

teachings which would suggest the Examiner's proposed modification to arrive at the invention claimed in the present application. Rather, the applied prior art lacks any recognition, let along suggestion, that the proposed modifications could be beneficial. Additionally, it is unclear (and the Examiner has failed to provide any explanation of) how one skilled in the art one could go about modifying the applied references as proposed to arrive at the subject invention.

As noted above, in rejecting **claim 1**, the Examiner acknowledges that Osuna fails to disclose the required use of the described SVM for classifying the gender of a test image with respect to the hyperplane. The Examiner therefore proposes to modify Osuna, based on Gutta's disclosure of a system for classifying the gender of a test image, to make obvious the invention recited in claim 1.

In this regard, the Examiner asserts that it would have been obvious to so modify Osuna "since determining the gender of a person is one of the basic identifying features of a person, and Gutta teaches that a trainable learning system can be used to classify face images by gender. In addition, Osuna suggests that his classification system can be utilized to classify any 'object classes in the real world that share similar characteristics'".

However, it is first respectfully submitted the Examiner's contentions ignore the fact that Osuna is directed solely to object detection not object classification. Thus, the quoted portion of Osuna, relied upon in support of the Examiner's contention that the proposed modifications are motivated, when read in context, fails to provide the requisite support. That is, Osuna's reference in the bridging paragraph on pages 133 and 134, to the "many other object classes and phenomena in the real world that share similar characteristics, for example, tumor anomalies in MRI scans, structural defects in manufactured parts, etc" (emphasis add), is simply communicating the fact that Osuna's system can detect objects within any classes/phenomena which "share similar characteristics". Although Osuna's explicit examples are limited to tumor anomalies and structural defects, the detection of human faces might have also been included.

However, there is nothing disclosed by Osuna in the relied upon text or elsewhere which would suggest that Osuna's SVM could be used for object

classification rather than object detection, or that there would be any potential benefit in doing so. Nor, is there any suggestion in Gutta, that an SVM, of the type disclosed by Osuna, could be used in the disclosed object classification system, in lieu of the Gutta's disclosed decision tree, or that there would be any potential benefit in doing so.

Furthermore, neither reference suggests how one might go about adapting Osuna's SVM for use in classifying different objects having similar characteristics based on slight differences in those characteristics (e.g. in the characteristics of male and female faces), rather than detecting objects having similar characteristics (e.g. of both male and female faces) with respect to other objects having substantially different characteristics.

With to respect to **claim 3**, the Examiner relies on Moghaddam's disclosure in column 11, lines 15-18, that the bounded image may be masked so as to include only the interior of the face and thereby reduce the amount of hair from the scaled image, in support of the rejection. The Examiner argues that masking the scaled images to reduce the amount of hair is obvious in view of Moghaddam, because scalp hair is not a facial feature and is therefore immaterial to determining gender.

However, the relied upon reference relates to object detection, not object classification. In object detection, the similarity of the object characteristics is important. Accordingly, because scalp hair is most often cut and styled differently by men and women, masking the scalp hair results in the characteristics of the male and female faces (i.e. the objects) becoming more similar, which is advantageous in detecting human faces.

On the other hand, scalp hair has conventionally been considered very material to determining the gender of a human face. That is, in gender classification, one is attempting to determine slight differences in faces, which have similar characteristics. Scalp hair is different which can be used to classify images of men and women by gender.

It is respectfully submitted that there is nothing, within any of the applied art references, to suggest that scalp hair could, let alone should, be beneficially be masked when determining the gender of a face. Rather, is be counter intuitive to mask scalp

hair in classifying gender.

3. THE APPLIED REFERENCES FAIL TO SUGGEST THE CLAIMED INVENTION

In rejecting claims under 35 U.S.C. 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); In re Warner, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967). It also is incumbent upon the Examiner to provide a basis in fact and/or cogent technical reasoning to support the conclusion that one having ordinary skill in the art would have been motivated to combine references to arrive at a claimed invention. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). In so doing, the Examiner is required to make the factual determinations set forth in Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 148 USPQ 459 (1966), and to provide a reason why one having ordinary skill in the art would have been led to modify the prior art reference to arrive at the claimed invention. Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985).

Such a reason must stem from some teaching, suggestion or inference in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 USPQ 929 (Fed. Cir. 1984); In re Sernaker, 702 F.2d 989, 217 USPQ 1 (Fed. Cir. 1983). Inherency requires certainty, not speculation. In re Rijckaert, 9 F.3rd 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986); W. L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983); In re Oelrich, 666 F.2d 578, 212 USPQ 323 (CCPA 1981); In re Wilding, 535 F.2d 631, 190 USPQ 59 (CCPA 1976). Objective evidence must be relied upon to defeat the patentability of the claimed invention. Ex parte Natale, 11 USPQ2d 1222 (BPAI 1988).

In determining obviousness, the inquiry is not whether each element existed in the prior art, but whether the prior art made obvious the invention as a whole for which patentability is claimed. Hartness Int'l, Inc. v. Simplimatic Eng'g Co., 819 F.2d 1100, 2

USPQ2d 1826 (Fed. Cir. 1987). It is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. In re Wesslau, 353 F.2d 238, 147 USPQ 391 (CCPA 1951). Piecemeal reconstruction of prior art patents is improper, In re Kamm, 452 F.2d 1052, 172 USPQ 298 (CCPA 1972). The Examiner must give adequate consideration to the particular problems and solution addressed by the claimed invention. Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); In re Rothermel, 276 F.2d 393, 125 USPQ 328 (CCPA 1960).

The fact that the prior art could be modified so as to result in the combination defined by the claims does not make the modification obvious unless the prior art suggests the desirability of the modification. In re Deminski, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986). The test is what the combined teachings would have suggested to those of ordinary skill in the art. In re Keller, 642 F.2d 413, 208 USPQ 817 (CCPA 1981). Simplicity and hindsight are not proper criteria for resolving obviousness, In re Warner, supra. Furthermore, as the Federal Circuit recently reiterated, reliance on common knowledge and/or common sense also cannot be the basis of finding obviousness (See In re Lee 61 USPQ 2d 1430 (Fed. Circ. 2002)). The deficiencies in the applied art cannot be remedied by general conclusions which, in view of the disclosure in the present application, may appear to be common sensible.

The proper approach to the issue of obviousness is whether the hypothetical person of ordinary skill in the art, familiar with the references, would have found it obvious to make a structure corresponding to what is claimed. In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Sernaker, 702 F.2d 989, 217 USPQ 1 (Fed. Cir. 1983). Hindsight obviousness after the invention has been made is not the test. In re Carroll, 601 F2d 1184, 202 USPQ 571 (CCPA 1979). The reference, viewed by itself and not in retrospect, must suggest doing what applicant has done. In re Shaffer, 229 F2d 476, 108 USPQ 326 (CCPA 1956); In re Skoll, 523 F2d 1392, 187 USPQ 481 (CCPA 1975).

Again, the issue is not whether it is within the skill of the artisan to make the proposed modification but, rather, whether a person of ordinary skill in the art, upon

consideration of the references, would have found it obvious to do so. The fact that the prior art could be modified so as to result in the combination defined by the claims would not have made the modification obvious unless the prior art suggests the desirability of the modification. See In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984), In re Deminski, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986), In re Keller, supra. See In re Laskowski, F2d., 10 USPQ2d 1397 (CAFC 1989).

Claim 1 requires classifying the gender of the test image with respect to the hyperplane.

As discussed above, the Examiner proposes to modify Osuna's object detecting SVM, to classify the gender of an object with respect to the hyperplane, based on Gutta's disclosure of a system for classifying the gender of a test image.

More particularly, the Examiner asserts that it would have been obvious to so modify Osuna "since determining the gender of a person is one of the basic identifying features of a person, and Gutta teaches that a trainable learning system can be used to classify face images by gender. In addition, Osuna suggests that his classification system can be utilized to classify any 'object classes in the real world that share similar characteristics'".

However, as set forth in the bridging paragraph on pages 133 and 134, what Osuna discloses is that "there are many other object classes and phenomena in the real world that share similar characteristics, for example, tumor anomalies in MRI scans, structural defects in manufactured parts, etc." Thus, Osuna does not suggest that the described object detection system can be utilized to classify any 'object classes in the real world that share similar characteristics". Rather, Osuna teaches that the described detection (not classification) system can be utilized to detect (not classify) any "object classes in the real world that share similar characteristics".

Furthermore, Osuna's system, as described, is capable of only performing a single determination required for object detection. That is, whether or not a particular object is a human face (be it male or female). It is respectfully submitted that there is nothing within Osuna to suggest that the described SVM could, or could be adapted to make the multiple determinations required for object classification, such as whether a

human face is a male face or whether a human face is a female face.

Accordingly, it is respectfully submitted that there is nothing disclosed within either of the applied Osuna and Gutta references to suggest the classifying of the gender of a test image with respect to the hyperplane, as required by claim 1.

What is suggested by the proposed combination of Osuna and Gutta is to first use Osuna's SVM to detect human faces (i.e. both male and female faces), and to then use Gutta's hybrid classifier system to determine if each detected face is male or female (see Gutta, section 3, first paragraph).

It is perhaps worthwhile highlighting that the Gutta publication predated that of Osuna. Hence, one might expect that had Osuna considered there to have been a reasonable likelihood that the described SVM could be adapted for gender classification, the Osuna publication would have made reference to such an application in the examples set forth in the paragraph bridging pages 133 and 134. However, this is not the case.

Claim 6 requires that the image contain less than 260 pixels.

The Examiner points to paragraph 1, of section 5 of Gutta, on page 1356, as disclosing a reduction in the resolution of the training and test images as required by claim 4. However, the Examiner then points to Osuna as disclosing that such reduction is too less than 260 pixels, as required by claim 6.

As discussed above, in section 3.2, on page 134, Osuna teaches that it is beneficial to detect objects using an SVM with low-resolution images (e.g. 361 pixel patterns). Gutta, in the first paragraph of section 5, on page 1356, teaches that it is beneficial to classify the objects (e.g. male and female faces) using a decision tree with high resolution images (e.g. 4608 pixels).

Hence, the applied combination of Osuna and Gutta also lack any teaching or suggestion of the limitations of claim 6.

Furthermore, taking the references as a whole, and assuming for the sake of argument that there was motivation to modify Osuna in view of Gutta (which it is respectfully submitted is not the case), one skilled in the art would at best be motivated to attempt to utilize the high resolution images disclosed by Gutta with Osuna's SVM.

Hence, the Examiner's position is inconsistent with the teachings of Gutta, that a relatively high-resolution image is required for gender classification.

Additionally, **claim 3** requires that the facial features include hair and that the scaled images are masked to reduce the amount of hair.

Claim 3 is also rejected over the base combination of Osuna and Gutta.

However, the Examiner has not identified any disclosure within the base combination to support this rejection.

Claim 3 is also rejected over the base combination, in further view of Moghaddam. The Examiner relies on Moghaddam's disclosure in column 11, lines 15-18, that the bounded image may be masked so as to include only the interior of the face and thereby reduce the amount of hair from the scaled image.

However, as noted above, the applied Moghaddam reference has overlapping inventorship with that of the present application, and relates to object detection, not object classification.

Furthermore, Moghaddam lacks any teaching or suggestion (and the Examiner has failed to identify any teaching or suggestion within Moghaddam) that scalp hair in training and test images should be masked when performing gender classification. Rather, Moghaddam only teaches that masking images to reduce the scalp hair is beneficial in face detection (not in gender classification).

4. THE REJECTION IS BASED ON EITHER AN IMPROPER HINDSIGHT RECONSTRUCTION OF THE INVENTION BASED ON THE APPLICATIONS OWN TEACHINGS OR ON PURE SPECULATION

Hindsight obviousness after the invention has been made is not the test. In re Carroll, 601 F2d 1184, 202 USPQ 571 (CCPA 1979). The reference, viewed by itself and not in retrospect, must suggest doing what applicant has done. In re Shaffer, 229 F2d 476, 108 USPQ 326 (CCPA 1956); In re Skoll, 523 F2d 1392, 187 USPQ 481 (CCPA 1975).

Inherency requires certainty, not speculation. In re Rijckaert, 9 F.3rd 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir.

1986); W. L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983); In re Oelrich, 666 F.2d 578, 212 USPQ 323 (CCPA 1981); In re Wilding, 535 F.2d 631, 190 USPQ 59 (CCPA 1976). Objective evidence must be relied upon to defeat the patentability of the claimed invention. Ex parte Natale, 11 USPQ2d 1222 (BPAI 1988).

Furthermore, as the Federal Circuit recently reiterated, reliance on common knowledge and/or common sense also cannot be the basis of finding obviousness (See In re Lee 61 USPQ 2d 1430 (Fed. Circ. 2002)). The deficiencies in the applied art cannot be remedied by general conclusions which, in view of the disclosure in the present application, may appear to be common sensible.

As discussed in detail above, the appealed claims have been rejected without objective factual support or rationale. The prior art cited in support of the rejections has been applied in a manner inconsistent with its own teachings. A combination has been asserted for which no motivation exists. Express limitations set forth in the claims have been completely or effectively ignored. The evidence shows that there is nothing in the applied prior art to support the Examiner's position that the present claims are obvious. Hence, at best, it can only be concluded that the rejection of the claims, as set out in the final Official Action, reflects an improper hindsight reconstruct the invention using the inventors own disclosure, or reliance on pure speculation.

CONCLUSION

It is respectfully submitted that the Examiner (i) has failed to establish a prima facie case for the rejection, (ii) has proposed to combine art in a manner which is unmotivated, (iii) has failed to apply art which teaches or suggests the claimed invention, and (iv) has, at best, attempted to improperly reconstruct the invention using the present application's own disclosure, or relied on pure speculation in rejecting the claims. Thus, the rejection of the pending claims over the applied prior art, whether taken individually or in any combination, is improper.

In summary, Applicants respectfully submit that the applied references do not teach or suggest features recited in each of the rejected independent claims, as well as features

recited in the dependent claims, and the Examiner has failed to provide reasonable evidence to support a contrary conclusion. Furthermore, the proposed combinations of the applied references are themselves unmotivated and therefore improper. Accordingly, it is submitted that the art does not provide any teaching, or suggestion within its teachings, which would lead to the features or advantages of the instant invention, and the claims patentably define over the art. The rejection can therefore only be based on an improper hindsight reconstruction or pure speculation. Thus, the rejection of the pending claims is in error, and reversal is clearly in order and is courteously solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 01-2135 and please credit any excess fees to such deposit account.

Respectfully Submitted,
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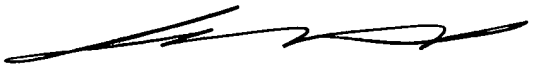

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APPENDIX OF CLAIMS UNDER APPEAL

1. A method for classifying images of faces according to gender, comprising the steps of:

supplying a vector support machine with a plurality of training images, the training images including images of male and female faces;

determining a plurality of support vectors from the training images for identifying a hyperplane;

supplying the support vector machine with a test image; and

classifying the gender of the test image with respect to the hyperplane.

2. The method of claim 1 further comprising the steps of:

scaling the training images to locate the faces; and

warping the scaled images to locate facial features.

3. The method of claim 2 wherein the facial features include hair, and further comprising the steps of:

masking the scaled images to reduce the amount of hair.

4. The method of claim 1 further comprising the step of:

reducing the resolution of the training images and the test image by sub-sampling before supplying the images to the support vector machine.

5. The method of claim 1 further comprising the step of:

maximizing a distance between the support vectors and error margins of the hyperplane.

6. The method of claim 4 wherein the image contains less than 260 pixels.

7. The method of claim 1 wherein the hyperplane is a non-linear hyperplane.

8. The method of claim 1 wherein the classification error is less than 4%.

9. (cancelled)

10. The method of claim 7 further comprising:
determining the non-linear hyperplane using a non-linear projection function.

11. The method of claim 10 wherein the projection function is a radial basis function that minimize an upper bound on an expected test error.

12. The method of claim 1 further comprising:
determining the hyperplane using a quadratic classifier.